

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference OPP021056KR	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/KR 2003/001048	International filing date (day/month/year) 28 May 2003 (28.05.2003)	Priority Date (day/month/year) 29 May 2002 (29.05.2002)
International Patent Classification (IPC) or national classification and IPC IPC⁷: C08G 64/40, C08G 64/20		
Applicant LG CHEM, LTD.		

- This international preliminary examination report has been prepared by this International Preliminary Examination Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 4 sheets, including this cover sheet.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
These annexes consist of a total of 2 sheets.
- This report contains indications relating to the following items:
 - ☒ Basis of the opinion
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain documents cited
 - ☐ Certain defects in the international application
 - ☐ Certain observations on the international application

Date of submission of the demand 29.12.2003	Date of completion of this report 12 August 2004 (12.08.2004)
Name and mailing address of the IPEA/AT Austrian Patent Office Dresdner Straße 87 A-1200 Vienna Facsimile No. 1/53424/200	Authorized officer BAUMSCHABL F. Telephone No. 1/53424/459

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/KR 2003/001048

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed

☒ the description:

pages 1 - 19, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____.

☒ the claims:

pages _____, as originally filed

pages _____, as amended (together with any statement) under Article 19

pages 20,21, filed with the demand

pages _____, filed with the letter of _____.

☒ the drawings:

pages 23, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____.

☐ the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____.

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

☐ the description, pages _____.

☒ the claims, Nos. 2.

☐ the drawings, sheets/fig _____.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as „originally filed“ and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/KR 2003/001048

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement	Novelty (N)	Claims ----	YES
		Claims 1, 3-5	NO
	Inventive step (IS)	Claims ----	YES
		Claims 1, 3-5	NO
	Industrial applicability (IA)	Claims 1, 3-5	YES
		Claims ----	NO

Citations and explanations (Rule 70.7)

The newly filed claims are accepted but claims 3 to 5 have to be renumbered to 2 to 4.

US 6288203 B1 relates to a process for the production of polycarbonate. Example 1 teaches also the use of reduced pressure (reducing pressure from 300mm to 12mm Hg within a period of 1.1 hours). Further reaction steps are started in a glass autoclave with stirrer to increase the average molecular weight and cristallinity. According to column 10, lines 32 – 39 any conventional reactors are employable herein. The reaction conditions are assumed to be equal to the conditions of the present application and leading also to high molecular weight polycarbonate(example 6, 35 700).

EP 0338085 A1 relates to a process for preparing crystallized aromatic polycarbonate. Page 10, lines 33 – 41 recommends reduced pressure (example 1: 2mm – 5 mm Hg) or a stream of inert gas while agitating the system to remove unwanted by-products (purging by-products; e.g. aromatic monohydroxy compounds). The principle of converting prepolymers to high molecular weight aromatic polycarbonates is the same as claimed in the present application. A great varity of conditions are discussed (page 15, lines 41 – 45, stirrer or rotating reactor) leading to crystallized aromatic polycarbonates having a weight average molecular weight from 6.000 to 200.000.

EP 848030 A1 relates to a process for producing polycarbonate prepolymer granules for solid state polymerisation. Examples 1 and 3 lead to polymers with a molecular weight of 30.400 or 34.400. A stainless container equipped with a stirrer is used. The pressure is reduced stepwise to 10mm Hg.

US 5981051 A relates to a method for producing granular polycarbonate prepolymer for solid-state polymerisation. Column 3, lines 47 – 51 (example 1) recommends to reduce the pressure to 1mm – 10mm Hg. Reaction conditions are similar to EP 848030 A1.

WO 01/21681 A1 relates to a method of cristallizing low molecular polycarbonate and a method for preparing a polycarbonate resin having a desired intrinsic viscosity. Low

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.
PCT/KR/01048

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V (page 1)

molecular weight polycarbonate can be subjected to solid phase polymerisation by heating it under reduced pressure or in an inert gas flow to convert it into an aromatic polycarbonate of high degree of polymerisation.

From the state of the art cited in the search report it is evident that the subject matter of the present application according to claims 1 to 4 is not considered to be new and does not involve an inventive step.

Industrial applicability is given.

29 DECEMBER 2003

WHAT IS CLAIMED IS :

1. (AMENDED)A process for preparing high molecular weight polycarbonate resin comprising the steps of:

5 a) melting dialkyl(aryl)carbonate and aromatic hydroxyl compound and conducting transesterification thereof to prepare low molecular weight amorphous polycarbonate prepolymer with weight average molecular weight of 1,500 ~ 15,000 g/mol;

b) conducting condensation polymerization of the a) low molecular weight amorphous polycarbonate prepolymer under pressure of 0 ~ 50 mmHg or nitrogen gas in an amount of at least 0.1 Nm³/kg·h for 2 ~ 120 minutes, to prepare middle molecular weight polycarbonate with weight average molecular weight of 20,000 ~ 30,000 g/mol and remove unreacted dialkyl(aryl)carbonate and by-products of low polymerization degree less than 3 in step a);

10

c) conducting solvent-induced crystallization of the b) middle molecular weight amorphous polycarbonate to prepare semi-crystalline polycarbonate; and

15

29 DECEMBER 2003

d) conducting solid state polymerization of the c) semi-crystalline polycarbonate to prepare high molecular weight polycarbonate with weight average molecular weight of 35,000 ~ 200,000 g/mol.

2. (CANCELED)

- 5 3. The process for preparing high molecular weight polycarbonate resin according to Claim 1, wherein the b) condensation polymerization is conducted in a reactor selected from a group consisting of a rotating disk reactor, rotating cage reactor and a thin film reactor.
4. The process for preparing high molecular weight polycarbonate resin
10 according to Claim 1, wherein the mole ratio (r) of diarylcarbonate and aromatic hydroxy compound of the middle molecular weight amorphous polycarbonate prepared in step b) is in the range of $0.9901 \leq r < 1.000$
5. The process for preparing high molecular weight polycarbonate resin according to Claim 1, wherein the d) solid state polymerization is conducted
15 within 2 hours.